A DEVELOPMENT OF WEB-BASED BERNESE AUTOMATED GLOBAL POSITIONING SYSTEM PROCESSING PACKAGE

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ABSTRACT

The Bernese Processing Engine (BPE) in the form of the scripts can be designed to run Bernese programs in an automated mode, and at the same time it can be made accessible online through the internet. By using the internet, more than one computer can run Bernese programs and in turn the program can be executed simultaneously by the same computer. Therefore a single script is needed to control all over the Bernese program, the automated mode of program, interfacing on the web server, the link with the internet, and interaction with the online users at the same time, especially on the user-friendly Windows Operating System. The research methodology which is used is the designing and development of the Automation Script on the website in a personal application server. The server is built by transforming a personal computer using Internet Information Service (IIS). The website for server is developed and simulated by using hypertext technologies of Common Gateway Interface (CGI) and Hyper Text Markup Language (HTML), and interface between server and users is built to link processing area of Bernese software and internet access. The automatic process of Bernese uses the raw data of Global Positioning System (GPS) and the result is compared with manual processing. Through this research Bernese processing software version 4.2 shows that the program can be modified to run in automatic process and on the web server. The knowledge of development of the Web-based Global Positioning System (GPS) automated mode will be made accessible for contribution and dissemination of the automated solutions of the GPS data from International GPS Service (IGS) stations and helping other projects to produce straightforward results, particularly for the Universiti Teknologi Malaysia (UTM).

ABSTRAK

Bernese Processing Engine (BPE) di dalam bentuk skrip boleh digunakan untuk menjalankan program Bernese dalam bentuk automatik, dan pada masa yang sama ia boleh diakses pada bila-bila masa melalui internet. Dengan menggunakan internet, lebih daripada satu komputer boleh digunakan untuk menjalankan program Bernese dan pada masa yang sama program itu boleh dipakai secara berterusan dengan menggunakan komputer yang sama. Dengan itu satu skrip khas diperlukan untuk mengawal penggunaan program Bernese, mod automatik daripada program, bersaling tindak dengan web server, hubungan dengan internet, dan interaksi dengan pengguna internet pada masa yang sama; khasnya bagi penggunaan sistem operasi Windows. Metodologi yang digunakan adalah dengan merekabentuk dan membangunkan skrip automatik pada aplikasi laman-web peribadi. Server dibina dengan menukarkan komputer peribadi yang menggunakan *Internet Information Service* (IIS). Untuk server dibangunkan dan disimulasikan dengan menggunakan teknologi *Common Gateway Interface* (CGI) dan *Hyper Text Markup Language* (HTML), interaksi antara server dan pengguna dibina untuk memproses perisian Bernese dan mengakses internet. Program automatik Bernese menggunakan data awal daripada *Global Positioning System* (GPS) dan hasilnya dibandingkan dengan penghitungan secara manual. Program Bernese memperlihatkan bahawa program itu boleh digunakan untuk proses automatic dan penggunaan server. Pengetahuan dalam pembangunan web berasaskan GPS Bernese automatik akan memudahkan penggunaan dan perluasan hasil-hasil automatik data GPS dari stesen servis antarbangsa GPS dan membantu projek-projek lain untuk menghasilkan data yang cepat, khususnya untuk penggunaan di Universiti Teknologi Malaysia (UTM).

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CHAPTER 1

INTRODUCTION

1.1 Introduction

An automated system becomes an important key to ease the processing and analysis of data collected by a network of Global Positioning System (GPS) stations. Malaysia, which has 12 GPS active stations that located throughout the country, requires the time consuming data processing tasks to be performed automatically. (Satirapod et al., 2000)

1.2 Problem Statement

As more than one computer can be used to run a program and also as the programs can be run online through internet or Local Area Network (LAN) cable or Wireless LAN (WLAN), a system of GPS data processing using Bernese software which runs automatically and allow online users to access the program simultaneously must be considered.

Three important aspects of the system are:

1. Ability of automation of the program.

2. Creation of web's interface and the operation of web server where the program would be placed. A single script is needed to control all over the Bernese program.
3. Automated mode of program in the web server, link with the internet, and interaction with the online users.

1.3. Research Objectives

The objectives of this study are as the following:

1. To carry out interactive GPS processing system using Bernese software package.
2. To develop Processing Control Script (PCS) for automation of the GPS processing system.
3. To develop and implement the web-based GPS automated processing system.

1.4. Research Scopes

This research focuses on the design and development of the web-based GPS automated processing system using Bernese version 4.2 on the Windows platform (both Windows 98 and XP). The Hypertext Transport Transfer Protocol (HTTP) such as the Common Gateway Interface (CGI) and the File Transfer Protocol (FTP) are to be used as internet media for the exchange of GPS data between server and user. The automation will be based on GPS Single Point Positioning.

1.5 Contribution of Research

The benefit for development of the GPS automated system hopefully will contribute to the dissemination of automated GPS solutions for the GPS users in the country.

This research is useful in supporting the existing MASS (Malaysia Active Satellite System) stations, developed by Geodetic Data Processing Center (GDPC) of Department of Survey and Mapping (Jupem, 2005) or other International GPS service (IGS) station.

The Web-based GPS processing system will be useful to the online users in the country to submit their GPS data files via internet for automatic processing (result will be notified via the email).

1.6 Research Methodology

Figure 1.1 shows the flowchart of methodology for this research. In order to achieve the objectives which is explained further by seven outlines of this thesis.

A preliminary study of literatures is reviewed. The literature review is carried out to make sure all important and significant aspects of research being considered. Discussion of the whole concept follows.

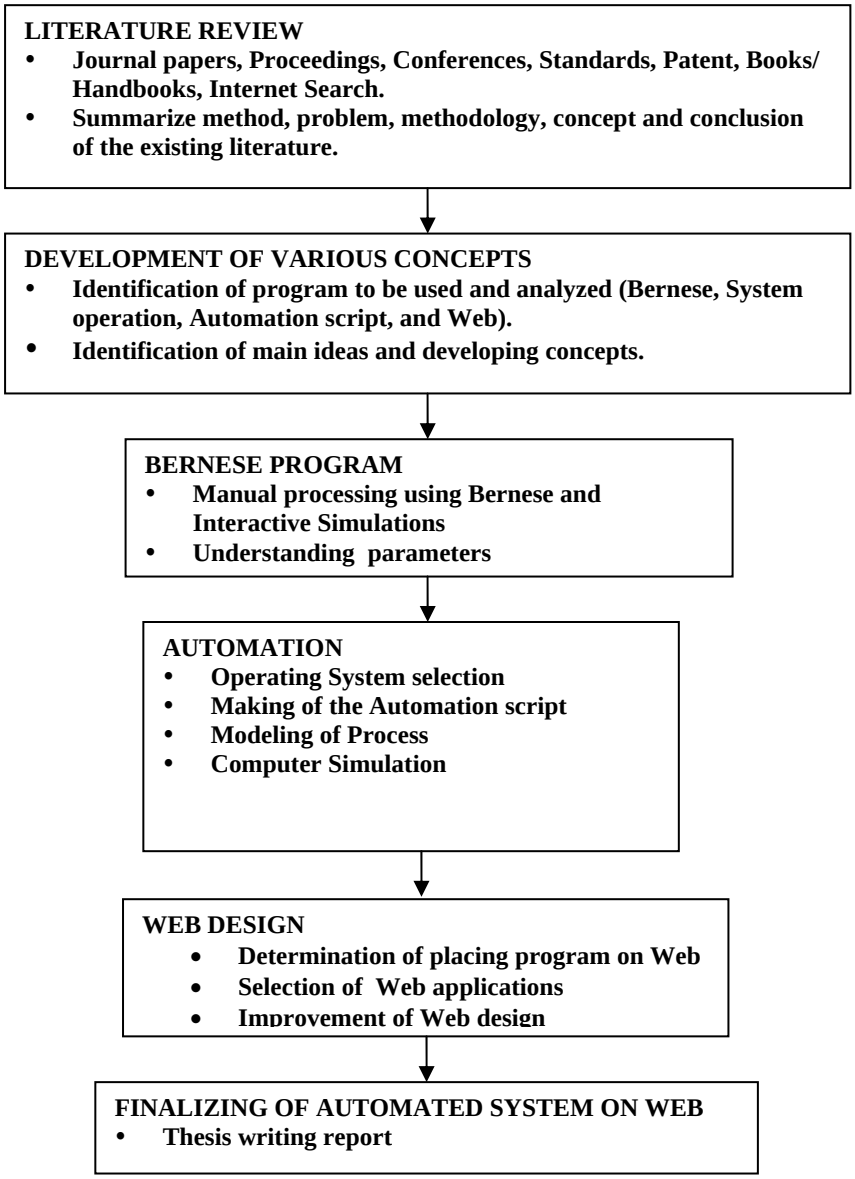

Figure 1.1 General Flowchart of Research Methodology

By using Journal papers, proceedings, conferences, books, handbooks, and Internet search, we can summarize appropriate methods for methodology, concepts, and creating the script for GPS Automation Processing System.

The next step is identification of program to be used and analyzed. In this research Bernese software version 4.2 is used. UTM has a registered copy (education version) of this software that could be run on the LINUX Operating-System. The Operating system that is used in this research is Microsoft Windows 2000 and XP.

The media for creating the Automation Script and the Web is a Personal Computer at FKSG laboratory, which was set-up for the purpose of providing the preliminary server for this project.

The Server for this research is built by transforming a Personal Computer using Internet Information Service (IIS) and active Practical Extraction and Reporting Language (active PERL). The Web for the server is developed and simulated by using many types of the hypertext technologies such as Common Gateway Interface (CGI), Page Hypertext Preprocessors (PHP), Active Server Page (ASP) and Hyper Text Markup Language (HTML) by the Microsoft Frontpage.

1.7. Thesis Outline

Thesis consists 7 chapters. Chapter 1 presents discussion on the topic being studied such as issues and problems, research objectives, scope of study, significance of study, and research methodology.

The related theory used is being discussed in Chapter 2. The discussion is focused on definition, concept about GPS measurement, Bernese short-review, the processing of data in Bernese software, and Automation Script.

Chapter 3 discusses largely on the basic operation of the Bernese version 4.2, the Orbit computation, Data Programming and the final Estimation strategies according to the type of GPS observation.

Chapter 4 deals with the development of the automation process by using the Bernese software, testing a simple input-data from the RAW data for particular baseline and processing a Single Point Positioning automatically.

Chapter 5 gives analysis of the way to set-up a Server, the techniques to combine the Server's program and the user request, the media of interaction

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